

SWITCHABLE LIGHTNING ARRESTER SYSTEM

BACKGROUND OF THE INVENTION

This invention relates to switchable contact of lightning arresters to power lines on power poles and on or near transformers.

5 Currently, the most commonly used lightning arresters on power poles and on or near transformers are not designed to continue to operate repeatedly after nearly all lightning strikes, but to be sacrificial with designedly predetermined self-destruction from lightning electrical surges in excess of design amounts which are most typically 10 KV.

10 After sacrificial self-destruction, the lightning arresters must be replaced promptly at high risk by line workers. The high risk results from not shutting down power lines to a self-destructed lightning arrester while line workers electrically connect a replacement lightning arrester to a power line in order to avoid interruption of electrical service to residential and commercial power users and in

15 order to save high power-plant costs. For initial installation of lightning arresters, power to power lines and transformers can be delayed until the lightning arresters are installed. Shutdown of a power line is expensive and time consuming for single and separate replacement of lightning arresters because (a) high power-plant-employee costs in addition to power-line workers are required and (b) shutdown for

20 a single power line or transformer often requires shutdown of branched power lines to a plurality of users. Accordingly, power-line workers are often under employment pressure to avoid injury-preventive shutdowns for replacing single lightning arresters. Generally, the replacement can be accomplished safely, but serious injury and death of line workers result frequently from unexpected electrical surges and

from accidental occurrences during replacement and electrical-line contact of the lightning arresters without safety shutdowns.

There is no known switchable lightning-arrester system for allowing replacement of lightning arresters with safe electrical connection to a power line
5 without interrupting electrical service and without expensive power-plant shutdown of power in a manner taught by this invention.

Examples of most-closely related known but different devices are described in the following patent documents:

	<u>U.S. Patent No.</u>	<u>Inventor</u>	<u>Issue Date</u>
10	2,296,991	Fox	09-29-1942
	3,614,700	Beard, <i>et al.</i>	10-19-1971
	3,497,148	MacDonald	08-07-1990
	4,688,013	Nishikawa	08-18-1987
	4,546,341	McNaghten, <i>et al.</i>	10-08-1985
15	4,795,996	Brown, et al.	01-03-1989
	4,814,550	Newberg	03-21-1989
	4,450,425	Manning	05-22-1984

SUMMARY OF THE INVENTION

Objects of patentable novelty and utility taught by this invention are to provide
20 safe, quick, convenient and inexpensive line work and replacement of lightning arresters following lightning damage; and

to provide optional utilization or non-utilization of conventional power-line structure and technology of lighting arresters with the safety-switchable lightning-arrester system.

25 This invention accomplishes these and other objectives with a switchable lightning-arrester system having a safety-switchable connector which can include a

counter-lever safety connector, a slide safety connector, a hinged safety connector or a pivot safety connector intermediate a power line and a lightning arrester for on-spot disconnection to protect workers from self-destructing arresters when changing lightning arresters or working on damaged lines without costly, time-consuming and

5 power-disruptive shutdown of power lines. This is highly important because the lightning arresters are changed and repair work is done on damaged lines as quickly after self-destruction from lightning surges as possible when lightning storms are very likely to still exist in the area requiring the change and repair. The safety-switchable connectors are made to be operable and changeable from a safe distance

10 remotely, which is preferably from a ground position near a light pole, a transformer or other line support. Many line-worker lives have been lost in the past without this safety-switchable connector.

The above and other objects, features and advantages of the present invention should become even more readily apparent to those skilled in the art upon a reading

15 of the following detailed description in conjunction with the drawings wherein there is shown and described illustrative embodiments of the invention.

BRIEF DESCRIPTION OF DRAWINGS

This invention is described by appended claims in relation to description of a preferred embodiment with reference to the following drawings which are

20 explained briefly as follows:

FIG. 1 is a partially cutaway side elevation view of a closed mode of a counter-lever embodiment of the switchable lightning-arrester system having a counter-lever safety switch and mounted on an arrester-attachment base for

attachment to a power-line support that can include transformers and light posts and for operation from an attachment side;

FIG. 2 is a partially cutaway side elevation view of the counter-lever embodiment mounted on the attachment base for operation from a different side
5 than the attachment side;

FIG. 3 is a partially cutaway side elevation view of a top portion of the counter-lever embodiment in an open mode;

FIG. 4 is a side view of an open-lock pin;

FIG. 5 is a partially cutaway side elevation view of the counter-lever
10 embodiment for use of a remote actuator that includes a contraction-force spring;

FIG. 6 is a partially cutaway side elevation view of the counter-lever embodiment for use of a remote actuator that includes a remote-control motor having a linear-actuation bar;

FIG. 7 is a partially cutaway side elevation view of a top portion of the
15 counter-lever embodiment for optionally hand or remote-tool operation;

FIG. 8 is a partially cutaway side elevation view of a top portion of the counter-lever embodiment for optionally hand or remote-electrical operation and being in a closed mode;

FIG. 9 is a partially cutaway side elevation view of a closed mode of an
20 embodiment of the switchable lightning-arrester system having a slide safety switch with a connection insert that is opened and closed from a lever side of a slide connector;

FIG. 10 is a partially cutaway side elevation view of an open mode of the
FIG. 9 illustration;

FIG. 11 is a partially cutaway side elevation view of a closed mode of an embodiment of the switchable lightning-arrester system having a slide safety switch with a connection insert that is opened and closed from opposite a lever side of the slide connector;

5 **FIG. 12** is a partially cutaway side elevation view of an open mode of the **FIG. 11** illustration;

FIG. 13 is a partially cutaway side elevation view of a closed mode of the **FIG. 11** illustration with the control lever being on an opposite of the lightning arrester and with the control lever pivotal upwardly to the closed mode;

10 **FIG. 14** is a partially cutaway side elevation view of a closed mode of an embodiment of the switchable lightning-arrester system having a hinged safety switch on a hinge rod in a hinge bay;

15 **FIG. 15** is a partially cutaway side elevation view of the **FIG. 14** illustration; having a support connector for connecting an arrester-attachment base to a line-support platform independently of a power-line support or pole;

15 **FIG. 16** is a partially cutaway front elevation view of the **FIG. 14** illustration;

20 **FIG. 17** is a partially cutaway side elevation view of an open mode of the switchable lightning-arrester system having the hinged safety switch on a hinge rod removed from the hinge bay for being either removed for discard by downward travel or replaced and closed by upward travel;

25 **FIG. 18** is a top view of the **FIG. 16** illustration;

25 **FIG. 19** is a bottom view of the **FIG. 16** illustration;

25 **FIG. 20** is a partially cutaway side elevation view of a closed mode of a pivot-connector embodiment with a pivot axle on an arrester side of a pivotal connection;

FIG. 21 is a partially cutaway side elevation view of an open mode of the **FIG. 20** illustration;

FIG. 22 is a partially cutaway front elevation view of the **FIG. 20** illustration;

FIG. 23 is a top view of the **FIG. 20** illustration;

5 **FIG. 24** is a partially cutaway side elevation view of a closed mode of the pivot-connector embodiment with the pivot axle on a line side of the pivotal connection; and

FIG. 25 is a partially cutaway fragmentary side view of a top portion of an open mode of the **FIG. 24** illustration.

DESCRIPTION OF PREFERRED EMBODIMENT

Listed numerically below with reference to the drawings are terms used to describe features of this invention. These terms and numbers assigned to them designate the same features throughout this description.

5	1. Lightning arrester 2. Base end 3. Power-line end 4. Link bolt 5. Arrester fins 6. Ground end 7. Terminal end 8. Arrester-attachment base 9. Power-line support 10. Safety-switchable connector 11. Power line 12. Ground-line connector 13. Ground line 14. Counter-lever safety switch 15. Switch platform 16. Fulcrum pillar 17. Pillar end 18. Line-support arm 19. Support-arm axle 20. Switch-rod end 21. Power-line clamp 22. Switch rod 23. Control lever 24. Control-lever handle 25. Control-lever axle 26. Control-link rod 27. First link-rod end 28. First link axle 29. Second link-rod end 30. Second link axle 31. Open-lock aperture 32. Open-lock pin 33. Contraction-force spring 34. Pin ring 35. Remote-control motor 36. Linear-actuation bar 37. Wrench socket 38. Hand knob 39. Electrical socket	40. Slide safety switch 41. Slide platform 42. Slide-fulcrum pillar 43. Slide pillar 44. Line-support platform 45. Slide aperture 46. Slide rod 47. Connection insert 48. Slide-rod axle 49. Lever-link rod 50. Lever-link axle 51. Connector-side pillar groove 52. Lever-side pillar groove 53. Slide groove 54. Pillar stop 55. Lever stop 56. Hinged safety switch 57. Hinge rod 58. Hinge bay 59. Bifurcation arms 60. Handle base 61. Latch knob 62. Spring latch 63. Latch stop connector 64. Arcuate guides 65. Hinge-rod base 66. Support connector 67. Pivot safety switch 68. Connector base 69. First connector boss 70. Second connector boss 71. Connector plug 72. Pivot member 73. Pivot axle 74. Tapered sides 75. Tapered ends 76. Support pillar
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Referring to FIGS. 1-8, the switchable lightning-arrester system can include counter-lever-switchable connection with a lightning arrester 1 having a base end 2, a power-line end 3 and a link bolt 4 positioned internally from arrester fins 5. The link bolt 4 has a ground end 6 proximate the base end 2 and a terminal end 7 proximate the power-line end 3. An arrester-attachment base 8 is provided for receiving the base end 2 of the lightning arrester 1 for attaching the lightning arrester 1 to a power-line support 9.

A safety-switchable connector 10 proximate the power-line end 3 of the line bolt 4 is articulated for open and closed switching of electrical communication from 10 a power line 11 to the link bolt 4 and to a ground-line connector 12 proximate the ground end 6 of the link bolt 4 for connecting a ground line 13 to the line bolt 4.

The safety-switchable connector 10 can include a counter-lever safety switch 14 having a switch platform 15 to which the terminal end 7 of the link bolt 4 is attached. A fulcrum pillar 16 is extended vertically upward from a pillar end 17 of 15 the switch platform 15. A line-support arm 18 is attached pivotally to a support-arm axle 19 proximate a top of the fulcrum pillar 16. The line-support arm 18 is extended from proximate the support-lever axle 19 to a switch-rod end 20.

A power-line clamp 21 on the switch-rod end 20 is positioned vertically above the link bolt 4 in a closed mode of the counter-lever safety switch 14. A switch rod 20 22 is extended downward vertically from the line-support arm 18 for contacting the terminal end 7 of the link bolt 4 in a closed mode of the counter-lever safety switch 14. The support-arm axle 19 is positioned horizontally on the fulcrum pillar 16 at a control-fulcrum distance upwardly from the switch platform 15.

A control lever 23 having a control-lever handle 24 is attached pivotally to the 25 fulcrum pillar 16 with a control-lever axle 25. A control-link rod 26 has a first link-

rod end 27 attached pivotally to the line-support arm 18 with a first link axle 28. The control-link rod 26 has a second link-rod end 29 attached pivotally to the control lever 23 with a second link axle 30.

The control-link rod 26 is articulated and positioned intermediate the line-support arm 18 and the control lever 23 for transmitting downwardly locking force on the line-support arm 18 from downward travel of the control lever 23 and for transmitting upwardly unlocking force on the line-support arm 18 from upward travel of the control lever 23 as transmitted to the control-lever handle 24 selectively. The control-link rod 26 transmits a lock-shut mode of the counter-lever safety switch 14 with the switch rod 22 being in contact with the terminal end 7 of link bolt 4 by positioning of the first link axle 28, the second link axle 30 and the control-lever axle 25 in a straight line for transmitting lightning power to the ground line 13 for a use mode of the lightning arrester 1.

The control-lever handle 24 can be articulated for hand-grasping and for selectively remote grasping with a control rod.

The support-arm axle 19 is positioned a predetermined distance in a direction away from the pillar end 17 of the switch platform 15 for causing a predetermined central-actuation slant of the control lever 23, below which opening of the counter-lever safety switch 14 with upward travel of the switch rod 22 is prevented by offsetting leverage.

An open-lock aperture 31 is articulated and positioned in the control lever 23 for receiving an open-lock pin 32 for preventing downward travel of the control-link rod 26 and thereby preventing unintended downward actuation of the control lever 23.

The counter-lever safety switch 14 can include a remote actuator intermediate the fulcrum pillar 16 and the control lever 23 for remote actuation of the control lever 23 predeterminedly.

The remote actuator can include a contraction-force spring 33 in combination 5 with the open-lock aperture 31 that is articulated and positioned in the control lever 23 for receiving the open-lock pin 32 for preventing downward travel of the control-link rod 26 and thereby preventing unintended downward actuation of the control lever 23 by the contraction-force spring 33.

The open-lock pin 32 can include a remotely accessible pin ring 34.

10 The remote actuator can include a remote-control motor 35 having a linear-actuation bar 36 extended from the remote-control motor 35 to pivotal contact with the control lever 23 for actuating the linear-actuation bar 36 outwardly in a direction away from the fulcrum pillar 16 for opening and inwardly in a direction towards the fulcrum pillar 16 for closing the counter-lever safety switch 14.

15 The remote-control motor 35 can include a wrench socket 37 for rotation with a socket wrench.

The remote-control motor 35 can include a hand knob 38 for hand rotation.

The remote-control motor 35 can include an electrical socket 39 for receiving electrical current.

20 Referring to FIGS. 9-13, the switchable lightning-arrester system can include slide-switchable connection with the lightning arrester 1 having the base end 2, the power-line end 3 and the link bolt 4 positioned internally from arrester fins 5 of the lightning arrester 1. The link bolt 4 has the ground end 6 proximate the base end 2 and the terminal end 7 proximate the power-line end 3. The arrester-attachment

base 8 receives the base end 2 of the lightning arrester 1 for attaching the lightning arrester 1 to the power-line support 9.

The safety-switchable connector 10 proximate the power-line end 3 of the link bolt 4 for open and closed switching of electrical communication from the power line 11 to the link bolt 4 can include a slide safety switch 40 having a slide platform 41 to which the terminal end 7 of the link bolt 4 is attached detachably. Included also can be the ground-line connector 12 proximate the ground end 6 of the link bolt 4 for connecting the ground line 13 to the link bolt 4.

The slide-fulcrum pillar 42 is extended vertically upward from a pillar end of the slide platform 41. A slide pillar 43 is extended vertically upward from the slide platform 41 intermediate the slide-fulcrum pillar 42 and the link bolt 4. A line-support platform 44 is attached pivotally to a top of the slide pillar 43. The power-line clamp 21 is attached to a top of a line-support platform 44 with the switch rod 22 for holding the power line 11.

The slide pillar 43 has a slide aperture 45 for receiving a slide rod 46 having a connection insert 47 on a first end and a slide-rod axle 48 on a second end.

The connection insert 47 is articulated to contact a bottom end of the switch rod 22 and the terminal end 7 of the link bolt 4 for conveying lightning current to the lightning arrester 1.

A lever-link rod 49 is positioned intermediate the slide rod 46 and the control lever 23 with a first end of the lever-link rod 49 attached pivotally to the slide-rod axle 48 and a second end of the lever-link rod 49 attached pivotally to the control lever 23 with a lever-link axle 50;

The control lever 23 is attached pivotally to the slide-fulcrum pillar 42 with the control-lever axle 25.

The switch rod 22 is extended downward vertically from the line-support platform 44 for contacting the connection insert 47 with the slide safety switch 40 being in a closed-circuit mode with the control lever 23 oriented pivotally for sliding the slide rod 46 in opposite directions selectively.

5 The control-lever axle 25 is positioned predeterminedly above the slide platform 41 for allowing the control-lever 23 to be pivoted with the control-lever handle 24 being raised above a horizontal attitude of the control lever 23 for sliding the slide rod 46 and thereby moving the connection insert 47 out of contact with the terminal end 7 and the switch rod 22 for breaking circuitry of the counter-lever 10 safety switch 14 or optionally with the control-lever handle 24 being lowered below the horizontal attitude of the control lever 23 for sliding the slide rod 46 and thereby moving the connection insert 47 out of contact with the terminal end 7 and the switch rod 22 for breaking circuitry of the counter-lever safety switch 14 with the lever-link rod 49 having a double-end pivotal contact with the slide rod 46 and the 15 control lever 23.

As shown in FIGS. 9-10, the slide rod 46 can include an inwardly opening length for positioning the connection insert 47 in a closed mode of the counter-lever safety switch 14 with the connection insert 47 in electrical communication with the terminal end 7 and the switch rod 22 by positioning of the control lever 23 and the 20 lever-link rod 49 collinearly in line and for positioning the connection insert 47 inwardly towards the slide pillar 43 by optionally upward or downward pivoting of the control lever 23.

As shown in FIGS. 11-13, the slide rod 46 can include an outwardly opening length for positioning the connection insert 47 in a closed mode of the counter-lever 25 safety switch 14 with the connection insert 47 in electrical communication with the

terminal end 7 and the switch rod 22 by positioning of the control lever 23 and the lever-link rod 49 collinearly in line and for positioning the connection insert 47 outwardly in an opposite direction from the slide pillar 43 by optionally upward or downward pivoting of the control lever 23.

5 For controlling sliding travel of the slide rod 46, the switchable lightning-arrester system can further comprise a connector-side pillar groove 51 positioned circumferentially in an inside perimeter of the slide aperture 45 proximate a connector side of the slide pillar 43. A lever-side pillar groove 52 is positioned circumferentially in an inside perimeter of the slide aperture 45 proximate a lever 10 side of the slide pillar 43 and a slide groove 53 is positioned in an outside periphery of the slide rod 46.

The slide groove 53 is articulated to receive a major cross-sectional portion of a toroidal resilient washer. The connector-side pillar groove 51 is articulated to receive a remaining minor cross-sectional portion of the toroidal resilient washer and 15 the lever-side pillar groove 52 is articulated to receive the remaining minor cross-sectional portion of the toroidal resilient washer for restraining travel of the slide rod 46 from optionally open and closed modes of the counter-lever safety switch 14.

The switchable lightning-arrester system can further comprise a pillar stop 54 on the slide-f fulcrum pillar 42 articulated and positioned for arresting downward 20 travel of the control lever 23.

The switchable lightning-arrester system can further comprise a lever stop 55 on the control lever 23 that is articulated and positioned for arresting downward travel of the control lever 23.

Referring to FIGS. 14-19, for hinge-connection switching, the switchable 25 lightning-arrester system can comprise the lightning arrester 1 having the base end

2, the power-line end 3 and the link bolt 4 positioned internally from arrester fins 5 of the lightning arrester 1. The link bolt 4 has the ground end 6 proximate the base end 2 and the terminal end 7 proximate the power-line end 3. The arrester-attachment base 8 is articulated for receiving the base end 2 of the lightning arrester

5 1 predeterminedly for attaching the lightning arrester 1 to the power-line support 9. The safety-switchable connector 10 is positioned proximate the power-line end 3 of the link bolt 4 for open and closed switching of electrical communication from the power line 11 to the link bolt 4. The safety-switchable connector 10 for this embodiment includes a hinged safety switch 56 having a hinge rod 57 proximate the

10 base end 2 of the lightning arrester 1. The hinge rod 57 is positioned in a hinge bay 58 on the arrester-attachment base 8 for pivoting the lightning arrester 1 orthogonally to an axis of the hinge rod 57. The lightning arrester 1 is pivotal interchangeably between a closed mode of the hinged safety switch 56 with the terminal end 7 of the link bolt 4 in electrical communication with the switch rod 22 and an open mode of the hinged safety switch 56 with the terminal end 7 of the link bolt 4 being removed pivotally from the electrical communication with the switch rod 22.

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The ground-line connector 12 proximate the ground end 6 of the link bolt 4 is articulated for connecting a ground line 13 to the link bolt 4.

20 The hinge bay 58 is bifurcated in bifurcation arms 59 extended from the arrester-attachment base 8. The terminal end 7 of the link bolt 4 is positioned in a handle base 60 from which the control lever 23 having the control-lever handle 24 is extended laterally for positioning the hinge rod 57 in and out of the hinge bay 58 and for pivoting the lightning arrester 1 to and from a closed mode of the hinged

25 safety switch 56. The terminal end 7 can include a latch knob 61 that is latched with

a spring latch 62 that is extended laterally from a latch stop connector 63 that is in electrical communication with the switch rod 22 for communicating lightning current from the power line 11, through the switch rod 22, through the spring latch 62 and into the terminal end 7 of the link bolt 4. The latch stop connector 63 stops pivotal 5 travel of the lightning arrester 1 beyond a position of electrical connection of the latch knob 61 with the spring latch 62.

The bifurcation arms 59 can include arcuate guides 64 for guiding a portion of the lightning arrester 1 containing the hinge rod 57 between the bifurcation arms 59 while the hinged safety switch 56 is being opened and closed with the control 10 lever 23.

The base end 2 of the lightning arrester 1 has an attachable hinge-rod base 65 from which the hinge rods 57 are extended from opposite sides.

The hinged safety switch 56 can include a support connector 66 extended intermediate the arrester-attachment base 8 and the line-support platform 44.

Referring to FIGS. 20-25, for a pivotal connection, the switchable lightning-arrester system can include the lightning arrester 1 having the base end 2, the power-line end 3 and the link bolt 4 positioned internally from arrester fins 5 of the lightning arrester 1. The link bolt 4 has the ground end 6 proximate the base end 2 and the terminal end 7 proximate the power-line end 3. The arrester-attachment 15 base 8 receives the base end 2 of the lightning arrester 1 predeterminedly for attaching the lightning arrester 1 to the power-line support 9. The safety-switchable connector 10 proximate the power-line end 3 of the link bolt 4 for open and closed switching of electrical communication from the power line 11 to the link bolt 4 includes a pivot safety switch 67 positioned on the power-line end 3 of the lightning 20 arrester 1.

The pivot safety switch 67 has a connector base 68 that is attached detachably to the power-line end 3 of the lightning arrester 1. A support pillar 76 is extended orthogonally from the connector base 68 to the line-support platform 44.

A first connector boss 69 is extended predeterminedly from the connector base 5 68 in a direction towards the line-support platform 44. A second connector boss 70 is extended predeterminedly from the line-support platform 44 in a direction towards the connector base 68. A connector plug 71 is positioned removably in electrical communication with the first connector boss 69 and the second connector boss 70. The connector plug 71 is affixed to a pivot member 72 that is pivotal from a pivot 10 axle 73 on a predetermined side of the first connector boss 69 and the second connector boss 70 for pivoting the connector plug 71 into and out from electrical communication with the first connector boss 69 and the second connector boss 70 selectively.

The first connector boss 69 is in electrical communication with the terminal 15 end 7 of the link bolt 4. The second connector boss 69 is in electrical connection with the switch rod 22 for electrical communication with the power line 11.

As shown in FIGS. 20-21, the predetermined side of the first connector boss 69 and the second connector boss 70 on which the pivot member 72 is positioned can include a connector-base side with the pivot axle 73 positioned on the connector base 20 68 for pivoting the pivot member 72 in a direction towards the lightning arrester 1 for removing the connector plug 71 from intermediate the first connector boss 69 and the second connector boss 70.

As shown in FIGS. 24-25, the predetermined side of the first connector boss 69 and the second connector boss 70 on which the pivot member 72 is positioned can 25 include a line side with the pivot axle 73 positioned on the line-support platform 44

for pivoting the pivot member 72 in a direction opposite from the lightning arrester 1 for removing the connector plug 71 from intermediate the first connector boss 69 and the second connector boss 70.

The pivot axle 73 is preferably but need not be in line with the an axis of the
5 link bolt 4 and the switch rod 22. Being in line makes a better contact of the connector plug 71 with the first connector boss 69 and the second connector boss 70.

The connector plug 71 can include tapered sides 74 and the first connector boss 69 and the second connector boss 70 include tapered ends 75 that match taper of the tapered sides 74.

10 The pivot member 72 can include the control lever 23.

Referring further to FIGS. 20-25, the switchable lightning-arrester system can have the pivot safety switch 67 being attachable detachably to the terminal end 7 of the link bolt 4 proximate the power-line end 3 of the lightning arrester 1. The pivot safety switch 67 has the connector base 68 that is attached detachably to the power-line end 3 of the lightning arrester 1. The support pillar 76 is extended orthogonally from the connector base 68 to the line-support platform 44. The first connector boss 69 is extended predeterminedly from the connector base 68 in the direction towards the line-support platform 44. The second connector boss 70 is extended predeterminedly from the line-support platform 44 in the direction towards the connector base 68. The connector plug 71 is positioned removably in electrical communication with the first connector boss 69 and the second connector boss 70. The connector plug 71 is affixed to the pivot member 72 that is pivotal from the pivot axle 73 on a predetermined side of the first connector boss 69 and the second connector boss 70 for pivoting the connector plug 71 into and out from electrical communication with the first connector boss 69 and the second connector boss 70
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selectively. The first connector boss 69 is in electrical communication with the terminal end 7 of the link bolt 4 and the second connector boss 69 is in electrical connection with the switch rod 22 for electrical communication with the power line 11.

5 As shown in FIGS. 20-21, the predetermined side of the first connector boss 69 and the second connector boss 70 on which the pivot member 72 is positioned can include the connector-base side with the pivot axle 73 positioned on the connector base 68 for pivoting the pivot member 72 in the direction towards the lightning arrester 1 for removing the connector plug 71 from intermediate the first connector
10 boss 69 and the second connector boss 70.

As shown in FIGS. 25-25, the predetermined side of the first connector boss 69 and the second connector boss 70 on which the pivot member 72 is positioned can include the line side with the pivot axle 73 positioned on the line-support platform 44 for pivoting the pivot member 72 in the direction opposite from the lightning
15 arrester 1 for removing the connector plug 71 from intermediate the first connector boss 69 and the second connector boss 70.

The pivot axle 73 is preferably but not necessarily in line with the an axis of the link bolt 4 and the switch rod 22 of the lightning arrester 1 to which the pivot safety switch 67 is attachable.

20 The connector plug 71 can include tapered sides 74 in combination with the first connector boss 69 and the second connector boss 70 which include tapered ends 75 that match taper of the tapered sides 74. The pivot member 72 can include the control lever 23.